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COATING COMPOSITION

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This invention deals with a plastic material, and in particular with a coating composition.

It is an object of this invention to provide a coating composition for a film having a wrinkle-textured pattern which has an extremely pleasing appearance.

It is still another object of this invention to provide a film having a pattern formed by wrinkle-textured and non-wrinkled areas for which the use of two different compositions, such as a wrinkling and a non-wrinkling composition, is not required.

It is still another object of this invention to provide a process of making a film having a pattern of wrinkled and smooth areas which requires only one single coating composition.

These and other objects are accomplished by selectively drying a film forming coating whereby the areas to be wrinkled only are brought into a condition which is affectable by water, that means which wrinkle when water is applied to these areas, while the remaining areas will dry to a smooth film even when treated with water.

In my copending application, Serial No. 709,310, filed November 12, 1946, now U. S. Patent 2,510,966, it is set forth that coatings consisting of plastic material that is non-wrinkling per se, may be converted into a wrinkle-textured film by applying water thereto after skin formation. This process, however, can only take place if the skin is still soft enough to be cooled by the water, because only then are tensions created within the film and wrinkles formed during drying. Thus, there are two stages through which a film goes while being baked in which it is not affectable by water with regard to wrinkle formation, namely the stage prior to the formation of a skin and the stage when a skin has formed, but has become so hard and cool that water does not create any tensions and consequently not any wrinkles. Therefore, by heating predetermined selected areas of a coating or film to a degree when a skin has just formed and then immediately applying water before hardening of said skin, these skin covered areas will wrinkle when in contact with the water whereas the adjacent areas which may be either heated less than is necessary for skin formation or beyond said initial stage of skin formation will not be affected by the water and remain smooth after drying.

The differential heating necessary for materializing the objects of my invention may be carried out in various ways. Broadly, it is accomplished by supporting the coating or film during heating for skin formation on a composition material combined of areas of different specific heats, for instance on a metal plate with good heat conductivity in which areas have been cut out so that at these places the heat conductivity to the film is essentially reduced or on a plate with holes cut out and then filled with a material

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of different heat conductivity. Whereas in the former case, on account of the holes, a second continuous supporting plate for the film is necessary, such a plate may be dispensed with in the latter case. Thus, a metal plate with holes arranged in the pattern desired may be used as the element for the production of selective heating and a glass plate may be put thereover as the support proper for the film. On the other hand a belt may be used consisting of a stainless steel body in which holes have been provided and filled out with asbestos material; in this case the belt is both support and element for differential heating. Another embodiment for the combination support-differential heating element is a paper which has been printed with metal in the desired pattern, the printed places having a higher heat conductivity than the metal-free areas. It will be understood that various other methods and means may be selected for accomplishing the same result of selective heating.

One embodiment of the method of my invention, as it is preferably carried out, is as follows: A plastic coating composition, in the form of a solution, is spread in a thin film onto a glass plate or onto a plate combined of materials of different heat conductivities as described above. Thereafter the thickness is advantageously adjusted and made uniform by means of a knife, a doctor blade or other like means known in the art. In the case of a glass plate being used, this is then placed onto a metal plate in which the pattern desired has been cut out. The entire assembly is then subjected to infrared heat where the coating is heated until a skin starts to form in the areas which are to be wrinkled in the final film. Thereafter the plate with the film thereon is immediately immersed in water which preferably contains a wetting agent. There, the wrinkle formation proper takes place in the areas on which the skin had just formed previous to immersion.

After a few minutes of immersion, wrinkle formation is completed; the film is then rinsed with water in order to remove the wetting agent from its surface. Thereafter the film is heated for the purpose of eliminating the solvent therefrom. The film is then peeled off the supporting plate preferably by immersing the plate first into a solution of trisodium phosphate. The isolated film is finally allowed to air dry whereupon it is ready for use.

As set forth above, the coating may be exposed to infrared heat either for a time until a skin has just formed on the faster drying areas, or it may be exposed until the areas which are more slowly heated show a skin. In the latter case, the faster heated areas have already experienced a hardening of their skin so that the film will not become affected when immersed in water, while the areas heated more slowly will be wrinkled.

A composition which proved especially satisfactory for the invention, consisted of

150 grams vinyl chloride-acetate copolymer
100 grams butyl acetate
100 grams methyl ethyl ketone
125 grams cyclohexanone
25 grams diethylhexyl phthalate.

The copolymer used in this instance consisted of 87% by weight of vinyl chloride and 13% by weight of vinyl acetate. Diethylhexyl phthalate was used as a plasticizer. The film was supported by a glass plate which again was heated on a metal plate with holes therein in regular intervals; the temperature was maintained at approximately 140° F., measured on the metal plate, for the purpose of producing the skin. The film was exposed to this temperature for a time of about 1½ minutes, in which case the faster drying areas were to be wrinkled. An exposure to approximately 140° F. for 4 minutes, however, caused cooling and hardening of the skin on the faster drying areas and development of a skin on the slower drying areas. The skin-covered film was immersed into water with the wetting agent for approximately 3 minutes; the rinsed film was heated first to 120° F. for about half an hour and then to 220° F. until complete removal of the solvent. The time of immersion into the sodium phosphate solution was approximately 15 minutes. It is obvious that these times and temperatures are greatly dependent upon the thickness of the film, the materials used, distance of the heating source, concentration of the solution and other factors known to those skilled in the art.

All thermoplastic resins were found operative for the process and products of my invention. Thus, for example, vinyl acetate copolymers, vinyl chloride copolymers or a mixture of the two, chlorinated rubbers, styrene polymers and copolymers, cellulose acetate, cellulose acetate butyrate, cellulose acetate propionate, methyl cellulose, vinyl butyrate, polyethylene, butadiene copolymers such as butadiene acrylo nitrile and butadiene styrene copolymers, methyl methacrylate, vinylidene copolymer, vinyl alcohol polymers, vinyl acetate polymers, vinyl chloride-vinylidene chloride copolymer and mixtures of these substances are among those which were found satisfactory for the process of my invention.

As the solvents, those were preferred which have a high evaporation rate. For instance, methyl ethyl ketone, acetone, butyl acetate, cyclohexanone, xylol, toluol, toluol together with nitroparaffins, and amyl acetate were found highly satisfactory. The concentration of the resin solution depends upon the viscosity desired. Generally, a concentration of from 5 to 65 parts by weight of resin per 100 parts by weight of solution was the range found satisfactory. The viscosity preferred was approximately 36.2 centipoises at 25° C. However, this viscosity is by no means obligatory, especially not since the way of applying the coating composition also necessitates an adjustment of the concentration of the solution as will be set forth in a later paragraph.

While a resin solution consisting merely of resin and solvent is fully satisfactory, it is often advantageous and therefore desirable to add a plasticizer. All plasticizers known in the art are suitable for this purpose. Tricresyl phosphate, dioctyl phthalate and dibutyl phthalate are examples for suitable plasticizers.

Other auxiliary ingredients may be added to the resin solution without deviating from the concept of the invention. Thus filler materials, pigments and dyes may be incorporated into the coating solution.

The coating composition may be applied by any means known in the art. Knifing, rolling and spraying have been used with satisfaction. It will be obvious that for spraying, the use of a less viscous solution is advisable than is preferred for knifing or rolling.

Likewise, any wetting agents known in the art may be used; excellent results have been obtained with the addition of 10% of sodium sulfate of 3,9-diethyltridecanol-6 to the water.

The films obtained by the process described have a very pleasing appearance which can still be increased by the addition of dyes or pigments to the plastic material. The process of producing the films of this invention is extremely simple in view of the fact that although wrinkled and non-wrinkled textures are produced at the same time, only one composition and one step of application have to be used therefor. Once a "stencil" for differential heating has been made for one pattern, it can be used over and over again.

This application is a division of my copending application Serial Number 741,098, filed April 12, 1947.

It will be understood that while there have been described herein certain specific embodiments of the invention, it is not intended thereby to have it limited to or circumscribed by the specific details given in view of the fact that this invention is susceptible to various modifications and changes which come within the spirit of this disclosure and the scope of the appended claims.

I claim:

1. A coating composition comprising 150 parts by weight of a vinyl chloride-vinyl acetate copolymer, 100 parts by weight of butyl acetate, 100 parts by weight of methyl ethyl ketone, and 125 parts by weight of cyclohexanone.

2. A coating composition comprising 150 parts by weight of a vinyl chloride-vinyl acetate copolymer, 100 parts by weight of butyl acetate, 100 parts by weight of methyl ethyl ketone, 125 parts by weight of cyclohexanone, and a plasticizer.

3. A coating composition comprising 150 parts by weight of a vinyl chloride-vinyl acetate copolymer formed of 87% chloride and 13% acetate, 100 parts by weight of butyl acetate, 100 parts by weight of methyl ethyl ketone, 125 parts by weight by cyclohexanone, and a plasticizer.

4. A coating composition comprising 150 grams of vinyl chloride-vinyl acetate copolymer formed of 87% of chloride and 13% of acetate, 100 grams of butyl acetate, 100 grams of methyl ethyl ketone, 125 grams of cyclohexanone and 25 grams of diethylhexyl phthalate.

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